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<u>R E M A R K S</u>

Reconsideration and withdrawal of the rejections of the instant claims are requested in view of the foregoing amendment and the following remarks.

The Examiner is thanked for taking the time to conduct a telephonic interview with the undersigned attorney. Though no resolution was reached, the clarification to the outstanding rejection, that the examiner considers the "period of interruption" in Lam to constitute "off-line" as recited in the claims was beneficial to the further amendment to the claims.

By this amendment claims 1, 6, 9, 18, 26, 35, 40, and 50 are amended and claims 7 and 24 are canceled. Claims 1, 5, 9-14, 16-18, 22, 26-31, 33-40, 42-43, 45-46, and 49-50 remain pending in the application. No new matter has been added.

Claims 1, 5, 7, 9-11, 18, 22, 24, 26-28, 35-38 and 49 are rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent Application Publication No. 2005/0172092 to Lam et al. in view of Applicant's Admitted Prior Art (AAPA) incorporating U.S. Patent No. 6,434,681 to Armangau.

Claims 12-14, 16-17, 29-31, 33-34, 40, 42-43, 45-46, and 50 are rejected under 35 U.S.C. § 103(a) as unpatentable over Lam in view of AAPA and in further view U.S. Published Patent Application No. 2005/0025045 to Shimozono et al. and in further view of U.S. Published Patent Application No. 2005/0076157 to Serizawa et al.

With respect to independent claims 1, 18 and 35, 49 and 50. It is respectfully submitted that Lam together with the AAPA do not teach a method for providing an updated snapshot copy as recited in the independent claims, as amended. As stated in the office action, Lam appears to teach an asynchronous method which includes writing to a staging device (a journal) and then sending a write complete acknowledgement to the client or host. And Lam also appears to teach

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that when there is an interruption between the primary and backup storage system asynchronous

data storage is stopped and the delta replication method is performed. As part of this delta

replication method, the first two steps of the are the taking of a snapshot of the backup storage

and snapshot of the primary storage.

> at step 842, storage manager 220 performs a snapshot of data
> stored on primary storage system 130. From this point on, the <u>delta
> replication is performed based on the snapshot</u> of data in primary
> system 130 (Lam, paragraph [0070])

However, **while taking the snapshots** of the backup and primary storage the client (a

host) is idle, and therefore the storage manager cannot process any request for the client. That is,

the snapshot is taken "on-line" in terms of the applications that are running. It is only **after**

taking of the snapshot that the client (host) is released for further processing. This is clarified in

the next passage from Lam where it states:

> From this point on, the delta replication is performed based on the
> snapshot of data in primary system 130. Because the snapshot of
> data in primary system 130 is used to perform the delta replication,
> storage manager 220 may at this point resume processing data
> processing requests received from client 110 (Lam, paragraph
> [0070])

Clearly this portion of Lam teaches that the snapshot is take while the client is idle and prior to

its release to continue processing.

In contrast, as recited in the amended instant claims, while the snapshot is preformed by

the method of the instant application the host can execute any I/O operations, i.e., the host is not

idle and the snapshot is performed "off-line". Neither Lam nor the AAPA teach such a feature.

Further support of this distinction can be found with reference to Fig. 7, where it is shown

that during the data replication routine, data is copied from the primary storage system to the

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backup storage system **only after** snapshots were taken. The purpose of producing snapshot as claimed by Lam is to reduce risk of that data stored may be corrupted or lost. Thus Lam expressly refutes the contention expressed in the Office Action that I/O operations are handled while a snapshot of the primary storage device is performed.

As to the argument that delta replication is performed during "off-line." As mentioned in Lam, the delta replication routine is performed when there is an interruption between the primary and backup storage system. A snapshot of the data stored on the primary storage is performed only during delta replication. It is submitted that it is incorrect to equate "off-line" with the interruption between the primary and backup storage system. The "off-line" as referred to in the instant application refers to whether or not the host has been released to perform other I/O operations. In an on-line state the host cannot perform other I/O operations and when off-line the host has been released to perform further I/O operations. As used in the specification and the claims "on-line" and "off-line" are not related to the state of the network or connection. The Examiner is reminded that the applicant is free to be his own lexicographer and though the Examiner's interpretation may be reasonable if considered in a vacuum, in the context of the instant application and as clarified by the instant amendments, off-line refers to the host being released to perform other I/O operations, and cannot be interpreted as following an interruption as suggested by the Examiner.

Furthermore, the instant Application teaches that off-line operations are performed to take the snapshot volume. These actions include: checking if a data chunk residing in the snapshot volume was modified since a last time that the snapshot copy was created; if the data chunk has not been modified, then copying the data chunk from a location in the production storage to the snapshot volume and further copying the data in the journal to a location in the production

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storage; and if the data chunk in the snapshot volume has been modified, then copying the data chunk from said journal to said production storage element. This ensures that the snapshot volume includes the original data of the production storage and the production storage includes the updated data.

In contrast, while executing the delta replication as disclosed by Lam the primary storage is not updated. The only action preformed during the delta replication is copying of data from a primary storage to a backup storage (see paragraphs [0070] and [0071]). That is, the snapshot is taken prior to copying data from primary storage to a backup storage. In contrast, according to the claims of the instant Application the snapshot is taken **after** writing data to a journal. This represents a clear distinction which results from the different purposes of the instant invention as compared to that of Lam.

Still further with respect to the AAPA, specifically U.S. Patent No. 6,434,681 to Armangau, there is no teaching therein of copying data from a journal to a production volume. At best Armangau suggests "save changes" and "copy old on write" approaches for updating a snapshot. However, these approaches introduce a major drawback as writing data directly to the production storage device introduce latency, these deficiencies are described in detail in paragraphs [0013] and [0014] of the instant Application.

As to the rejections of claims 12-14, 16-17, 29-31, 33-34, 40, 42-43, and 45-46 and 50. As best understood, Shimozono discloses a switch installed between a computer and a storage unit and utilized to avoid location of a buffer or a cache memory required for recovering a path trouble in the conventional storage unit. The switch transfers data without the use of cache or buffer. Shimozono states "a switch for switching a path without having to use a buffer or a cache for transferring data or without having to add a new capability to the computer in a network of

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connecting the storage unit with the computer." (paragraph [0174]). Serizawa teaches a storage

system that does not include cache or any equivalent memory from where a host computer reads

data. Therefore, neither Shimozono nor Serizawa teach a similar concept to reading data from a

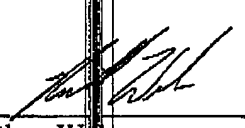journal while maintaining an updated snapshot copy.

For at least the foregoing reasons, it is submitted that independent claims 1, 18, and 35,

49, and 50 patentably distinguish over the relied upon portions of the cited references and are

allowable. Claim 5, 9-14, 16-17, 22, 26-31, 33-34, 36-40, 42-43, 45-46, and 48 which depend

from one of the allowable independent claims discussed above, are allowable therewith.

<div align="center"><u>Conclusion</u></div>

In view of the remarks set forth above, this application is in condition for allowance

which action is respectfully requested. However, if for any reason the Examiner should consider

this application not to be in condition for allowance, the Examiner is respectfully requested to

telephone the undersigned attorney at the number listed below prior to issuing a further Action.

Any fee due with this paper may be charged to Deposit Account No. 50-1290.

Respectfully submitted,

Nathan Weber
Reg. No. 50,958

CUSTOMER NUMBER 026304
Telephone: (212) 940-6384
Fax: (212) 940-8986 or 8987
Attorney Docket No.: RADSA 21.075 (101120-00058)
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